EARLY ("SUBCLINICAL") SYPHILITIC AORTITIS: AN EVALUATON OF RADIOGRAPHIC DIAGNOSTIC METHODS.

By HUGH J. MORGAN, M.D.,
NASHVILLE, TENN.
and (by invitation)
H. T. HILLSTROM, M.D., AND C. G. BLITCH, M.D.,*

INCIDENCE OF AORTITIS.

A. As a cause of heart disease:
Cohn 8—18%.

B. Among individuals infected with T. pallidum (based on necropsy diagnosis and necropsy findings):
Marchand ('03).
Frankel ('12).
Stadler ('12).
Langer ('26).
Moore, Danglade and Reisinger ('32) 80—90%.
Present study (59 cases) 78%.

C. Among individuals infected with T. pallidum (based on clinical diagnosis and necropsy findings):
Present study (50 cases—males) 38%.

D. In "subclinical" stage (based on clinical diagnosis and necropsy findings):
Present study (50 cases—males) 12%.
These cases had neither symptoms nor signs of aneurysm, aortic regurgitation, coronary orifice occlusion, etc., and offer the real diagnostic problem. Our efforts were directed against this problem and we turned to X-ray.
Kurtz and Eyster: X-ray signs in 90% of cases of chronic syphilis examined.
Steinfield, Pfahler & Klauder: X-ray signs are positive three times as often as other clinical signs.

E. Clinical Studies:
Material: 30 males, age 35-55 years, with acquired syphilis of 12 years duration or longer. None had symptoms or signs of aortitis, hypertension, anemia, thyrotoxicosis, arteriosclerosis, etc.
Methods: Fluoroscopic examination for

*From the Departments of Medicine and Surgery (Radiology), Vanderbilt University School of Medicine, Nashville, Tennessee.

a. Pulsation to right of sternum.
b. Increased density.
c. Irregularity.
d. Dilatation.
e. Tortuosity.
f. High, prominent aortic knob.
g. Relation of oesophagus, heart, and aorta (barium paste).

Films: (P-A.
(right anterior oblique.
(left anterior oblique.
(right lateral.

Measurements:
a. Kreuzfuchs'.
b. Root (Hampton and Jones).

F. Results:

G. Conclusions:

It is universally recognized that syphilis is an important cause of heart disease. Cohn[1] in a critical review of the literature bearing on the frequency of cardiovascular syphilis estimates that it constitutes from 8 to 18 per cent of all heart disease. It is pointed out[1] that in the United States the type of material analyzed determines to some extent the frequency of the condition, the incidence figure being slightly lower in Northern clinics, serving relatively few colored patients, than in Southern clinics with a large negro clientèle. Be that as it may, it is important to bear in mind the following facts: Syphilitic cardiovascular disease is responsible for death from heart disease in a fairly large group of people; syphilis, broadly speaking, is the one known cause of heart disease for which there is effective prophylactic or curative treatment; and finally, with present methods of treatment, the one hope for materially decreasing mortality from cardiovascular disease in individuals with chronic syphilis resides in the proper treatment of chronic and so-called latent syphilis and in earlier recognition of cardiovascular lesions.

Aortitis is the "ground pathology" of cardiovascular syphilis and it is the commonest visceral manifestation of syphilis encountered at necropsy. Marchand[2] (1903), Frankel (1912) and Stadler[3] (1912), report aortic disease in approximately 80 per cent of necropsies on individuals with acquired syphilis. Friedman[4] encountered evidence of aortitis in over half of the necropsies performed

on 83 individuals dying of general paresis. Langer,[5] in 1926, found a very high incidence of aortitis in an analysis of 1268 post mortem examinations of subjects with syphilis and stated that, at the time of his report, aortitis was being found in 80 per cent of such necropsies. Moore, Danglade and Reisinger[11] have recently stated that necropsy evidence indicates the presence of syphilitic aortitis in from 80 to 90 per cent of all adults with late syphilis. Other reports in the literature indicate similar findings. During the past five years there have been at the Vanderbilt University Hospital 59 necropsies in which the diagnosis of acquired syphilis was made by the pathologist. Forty-six of these, or 78 per cent, had readily demonstrable syphilitic aortitis.*

While the above figures indicate that aortitis is a very common visceral manifestation of acquired syphilis—indeed, the commonest recognized at necropsy—they do not, in our opinion, give reliable information concerning the incidence of aortitis in chronic syphilis. Many syphilitics reach the pathologist without gross changes indicative of the disease and thus escape diagnosis at autopsy. We have analyzed the very limited data accumulated at the Vanderbilt University Hospital during the past six years bearing on this point. The analyses were confined to the records of male patients. There have been 50 post mortem examinations of males who, during life, presented conclusive evidence of the presence of syphilitic infection. Twelve of these (24 per cent) were diagnosed aortitis before death and the diagnoses were confirmed at necropsy. In one instance clinically unrecognized syphilitic heart disease was present and was the cause of death. Among the remaining 37 there were six instances (12 per cent) of aortitis which were not diagnosed clinically. None of the six showed anatomically frank aortic valve defect, coronary orifice occlusion or aneurysm formation. Although all were males and were known to have chronic syphilis, in none was the presence of aortitis detected before death. In no instance could death be related to the presence of aortitis. The aortitis present in these six cases may with propriety be termed "subclinical." It is recognized that this group is too small to give us more than a very rough idea of the

*We are indebted to Dr. Claude Johnson of the Department of Pathology for these data.

incidence of "subclinical" aortitis in male patients with chronic syphilis. Nevertheless, it is of interest to contrast it with the incidence figure of clinically recognizable aortitis. In the Syphilis Clinic of the Vanderbilt University Hospital the diagnosis of cardiovascular syphilis was made only 67 times (4.3 per cent) in the study of 1541 patients (males and females) with chronic syphilis. If it is allowable to attach any importance at all to these figures they would seem to emphasize the difficulties encountered in the clinical recognition of early aortitis.

The clinical diagnosis of aortitis is made with accuracy only when one or more of the following diagnostic triad are present: (1) Symptoms typical of the condition, (2) signs of aneurysm, (3) signs of aortic regurgitation. In the absence of all of these and without gross changes in the aorta on physical and X-ray examination one cannot make the diagnosis even when chronic syphilis is known to exist. Moreover, the very group of patients with aortitis in whom antisyphilitic therapy would probably accomplish most are patients without these signs or symptoms. It would seem reasonable to assume that if we could detect aortitis before the development of the irreversible changes leading to aortic valve deformity, coronary orifice narrowing, or aneurysm formation, therapeutic results would be markedly improved. While clinical aortitis is but slightly affected by treatment such "subclinical" aortitis might be arrested and the development of the late, fatal manifestations prevented. With our present therapeutic equipment our hope for material improvement in treatment would seem to lie in the recognition of these "subclinical" cases.

In attempts to detect some objective sign indicating the presence of "subclinical" or early aortic lesions it is natural to turn to X-ray. A cursory review of the literature is rather encouraging. For example, Kurtz and Eyster[6] report evidence of aortitis in 90 per cent of the cases of acquired syphilis examined by them. This evidence is based on the presence of variations in shape of the ascending aorta, pulsation to the right of the sternum, and increased density of the descending aorta. Steinfield, Pfahler and Klauder[7] found evidence of aortitis three times as frequently by X-ray studies of a group of syphilitics as they did by other clinical studies alone. While not so enthusiastic

regarding the value of X-ray in diagnosis, the contributions of Holmes[8] and others are also encouraging. We therefore decided to review some of our material critically in order to determine whether these minor X-ray changes were present and more evident in this group than in normal people. If present even in the complete absence of other diagnostic features, they would render a provisional diagnosis permissible. Thus aortitis could be suspected, at least, in individuals with chronic syphilis before the development of coronary orifice constriction, aortic regurgitation, or aneurysm.

The material was carefully chosen. In order to increase the probability of the presence of aortitis we selected for the study 30 male patients between the ages of 35 and 55 years. All gave a history of acquired syphilis of at least 12 years' duration. In the group there were 3 paretics, 4 tabetics and 6 patients with meningovascular syphilis. The remainder were clinically diagnosed latent syphilis (11 cases), or active tertiary syphilis (6 cases). Care was taken to exclude from the group patients exhibiting conditions which might lead to confusion in the evaluation of X-ray findings, as hypertension, advanced arteriosclerosis, anemia, thyrotoxicosis, etc. In none of the patients did the history or physical findings indicate the presence of aortitis and none showed on X-ray examination gross, readily recognizable changes of aneurysm or advanced dilatation of the aorta. We have confined our study, then, to individuals with uncomplicated chronic syphilis without clinical evidence of aortitis, but in whom the incidence of "subclinical" aortitis is doubtless high. In such patients any deviation from the normal aortic X-ray findings would be significant and would constitute strong presumptive evidence of aortitis.

Pulsation of the aorta to the right of the sternum, increased density, irregularity, dilatation, tortuosity of the aorta, a high, prominent aortic knob, have all been reported as being suggestive of luetic aortitis. The patients were therefore all fluoroscoped with special attention to these points. Besides fluoroscopic examination in antero-posterior, postero-anterior, oblique and lateral positions, all patients were given a thick barium sulphate paste, and the relationship of the œsophagus, heart and aorta studied. Films of all patients were then made in the postero-anterior, right and left anterior oblique, and right lateral positions, the œsophagus again being visualized by

means of a barium paste. The usual cardiac measurements were made. The diameter of the aortic arch was measured at the point where the aorta indents the visualized œsophagus (Kreuzfuchs' Method).[9] Measurement of the root of the aorta by the method of Hampton and Jones[10] was attempted, but the method was not found to be entirely satisfactory, as the angle of rotation which showed the root of the aorta to best advantage fluoroscopically was difficult to reduplicate in the radiographic films.

In not a single instance were we able to detect changes in the aorta which are not encountered in perfectly normal individuals of the same age group. The studies were therefore entirely negative.

It is quite likely that there were instances of "subclinical" aortitis in the patients studied. All were males and all were in the second or third decade of syphilitic infection. A relatively large number had neurosyphilis. These facts suggest that in at least a few of our cases aortitis was present although not productive of X-ray signs. Although the group studied is too small to allow for definite conclusions we are inclined to the opinion that while the X-ray is of enormous value in confirming the presence of clinical aortitis and, occasionally, of disclosing the existence of "silent" aneurysms, it is of little or no value in disclosing early, "subclinical" disease.

BIBLIOGRAPHY.

1. COHN, A. E.: Am. Heart Jour., 2:275, 1927.
2. MARCHAND: Verhandl. d. deutsch. path. Gesellsch., 6:137, 1903.
3. STADLER, ED.: Syphilitic Aortenkronkung, Jena, 1912.
4. FRIEDMAN, E.: Arch. Neurol. Psychiat., 1:289, 1919.
5. LANGER, E.: Munch. Med. Wach., No. 73, 63:1782, 1926.
6. KURTZ, C., and EYSTER, J.: Am. Heart Jour., 6:67, 1930.
7. STEINFIELD, E., PFAHLER, G., and KLAUDER, J.: Arch. Int. Med., 32:556, 1923.
8. HOLMES, G. W., and RUGGINS, H. E.: "Roentgen Interpretation," Lea and Febiger, Publishers.
9. KREUZFUCHS, SIG: Med. Klin., No. 1, 16:36, 1920.
10. HAMPTON, A. O., and JONES, T. D.: Am. Jour. Roentgenology, No. 23, 23:390, 1930.
11. MOORE, J. E., DANGLADE, J. H., and REISINGER, J. C.: (In press).

DISCUSSION.

DR. ALBERT KEIDEL: Dr. Morgan's findings in this study of cases very closely parallel the experience that we have had in the Syphilis Department at the Johns Hopkins Hospital.

In the first place subclinical diagnosis is one which would have to be made, of course, by some technical procedure. Just as he has been unable, in examining a number of latent syphilitics or late cases of syphilis to be convinced that it is possible to make this diagnosis in the absence of clinical signs, experiences show that by other technical procedures, such as the use of electrocardiograms, it also fails. As a matter of fact, it seems to me that there is nothing very surprising in this because after all we are not dealing with a very early stage in the development of aortitis. Aortitis undoubtedly has its inception in the early stages of syphilis. The foundation for the lesion, at least, is made then, and while we all suspect that it is there in a large number of cases, nobody has been able to detect its presence as yet.

Secondly, as far as the autopsy findings are concerned, it is quite likely that they are at fault. Not all patients who have syphilis, late syphilis, come out with frank signs of syphilis; I mean to say those who are infected. As a matter of fact some 30-odd per cent of these patients, without any treatment at all, go through life without any late manifestations.

Not being able to make an early diagnosis of aortic syphilis is, after all, not such an important thing from the viewpoint of syphilology, because after all, patients naturally, if they are recognized as being syphilitic, will receive treatment, and treatment, when properly given, safeguards the patient from any serious consequences.

In a recent study which has not yet been published it can be shown that treatment after the clinical signs have developed is very adequate.

In a paper about to be published from our department by Moore and McTildy, it will be shown that when the disease is clinically recognizable, and the proper treatment is given and carried out for at least a year, no cases of aortic insufficiency or aneurysm have developed. This is in sharp contrast to the cases that have not been treated or at least not adequately treated where aortic insufficiency has developed.

This paper will present a series of about 80-odd patients studied clinically for aortitis, and all but 10 of these patients had been adequately treated. The adequately treated ones have not, after a lapse of from one to five years, developed any late lesions of the aorta or heart; whereas the ten that had not been adequately treated have developed aortic insufficiency.

It seems to me that the recognition of syphilis is the thing which safeguards the patient from the consequences of damage to the vascular apparatus. This, after all, today is not such a difficult thing to do, having at our command the better type of serologic tests by which, even in the absence of symptoms, the great majority of syphilitics can be discovered and treatment started.

The question of whether or not it is possible by means of technical pro-

cedures to recognize aortitis before the clinical signs and symptoms appear is, therefore, more or less academic. It has a greater interest for the internists and cardiologists because they, perhaps, have not always the high index of suspicion for syphilis that a man in this special field of syphilology would have. To a cardiologist it would seem rather more important to make this discovery early than it would to a syphilologist.

I think, perhaps, the thing that would be of greater value in the way of study would be to sharpen our criteria for considering what is clinical aortitis. There is not a general agreement on that, and a little better coördination of the data which are derived from the studies of a large series of cases of latent syphilis would probably lead to a little more prompt recognition of the disease. (Applause.)

PRESIDENT HAMMAN: Dr. Morgan's paper is now open for general discussion.

DR. MAURICE CHARLES PINCOFFS: It seems to me that while what Dr. Keidel says is partly true, that there is a certain academic quality to the diagnosis of the presence or absence of the subclinical (to use Dr. Morgan's word) aortitis in a known syphilitic, it is not entirely so. Certainly a number of cases of so-called syphilitic angina, usually occlusion of the coronary orifices, run a subclinical course until the last few weeks of their life, when they die with symptoms suggestive of angina.

I think it is fairly well established also that it is in that group with advanced occlusive changes around the orifices of the coronary that there exists a distinct danger in salvarsan therapy. In that group, which is not such a very small one in a large series of syphilitic aortic cases, there are a number of subclinical cases, and if one is unable to diagnose this aortitis or to suspect therefrom the possibility that coronary occlusion is already pretty well established, one might be dangerously radical in the starting in of one's salvarsan therapy; and I believe that deaths occur from time to time which are attributable to just that cause.

We have had three autopsies—that is, two in recent years and one many years ago—that I saw following the giving of salvarsan, in which the apparent cause of death was the anginal or anginoid type of attack following shortly after the treatment, and in which at autopsy occlusive changes in the coronary orifices were found.

I think attempts to arrive at a clinical diagnosis of subclinical aortitis are of value, and I think also that when one has reason to suspect aortitis, even though subclinically, it would be well to initiate therapy with salvarsan rather gradually and cautiously.

PRESIDENT HAMMAN: Is there any further discussion on Dr. Morgan's paper? Any further remarks? If not, perhaps Dr. Morgan would like to close the discussion.

DR. MORGAN: I simply want to suggest the necessity for the maintenance of a very critical attitude as regards this subject, and to protest against, as a

result of enthusiastic interest, the paying of a great deal of attention to signs and symptoms which are, I think, often misleading.

There is unquestionably an increased interest in this subject, and one encounters statements about the significance of the liquid quality of the second aortic sound as being of great importance in the recognition of aortitis, which I cannot subscribe to.

The same is true of these X-ray changes that have been described as being significant, increased density of the aorta, increased tortuosity, slight increased pulsation to the right of the sternum. Those suggestions apparently do not allow for the fact that hypertension, arteriosclerosis, anemia, and probably other conditions may give rise to these same signs, and I do feel that it is more than of academic interest that clinicians preserve and maintain a critical attitude in their diagnoses.